**Lab 4：The Continuous-Time Fourier Transform**

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| **Introduction**  The lab will explore amplitude modulation of Morse code messages and exercise about the continuous-time Fourier transform.  **Lab results & Analysis:**  4.6  Question(a)  屏幕剪辑  屏幕剪辑  Analysis  z = [dash, dash, dot, dot];  Question(b)  屏幕剪辑  屏幕剪辑  The result is as shown.  Question(c)  屏幕剪辑  屏幕剪辑  Analysis  The result is as shown.  The Fourier transforms of dot and dash lie roughly within the passband of the lowpass filter and they are each composed of low frequency components.  From the signal waveform, the original signal and the output signal waveform is basically the same. The output signal in the amplitude of some changes, in the time of some delay. This result shows that they are both low frequency, and the FFT transform frequency range is within the pass band of the low pass filter.  Question(d)  屏幕剪辑  屏幕剪辑  As the result figure shown, the most energy of the Fourier transform moves outside the passband of the filter and it meets the expectation.  Question(e)  屏幕剪辑  Question(f)  屏幕剪辑  屏幕剪辑  Analysis  According to the result figure, the Morse code should be [dash dot dot], which represents the letter D.  Question(g)  屏幕剪辑  屏幕剪辑  As the result shown, the Morse code of m2 and m3 should be [dot, dash, dash, dot] and [dot, dot, dot] respectively, which represent the letter P and letter S.  The future of technology lies in DPS. | |
| **Experience**  **12011124 冯柏钧**  C:\Users\16954\AppData\Local\Packages\Microsoft.Office.Desktop_8wekyb3d8bbwe\AC\INetCache\Content.Word\屏幕截图(29).png  C:\Users\16954\AppData\Local\Packages\Microsoft.Office.Desktop_8wekyb3d8bbwe\AC\INetCache\Content.Word\屏幕截图(34).png C:\Users\16954\AppData\Local\Packages\Microsoft.Office.Desktop_8wekyb3d8bbwe\AC\INetCache\Content.Word\屏幕截图(38).png  C:\Users\16954\AppData\Local\Packages\Microsoft.Office.Desktop_8wekyb3d8bbwe\AC\INetCache\Content.Word\屏幕截图(40).pngC:\Users\16954\AppData\Local\Packages\Microsoft.Office.Desktop_8wekyb3d8bbwe\AC\INetCache\Content.Word\屏幕截图(41).png  C:\Users\16954\AppData\Local\Packages\Microsoft.Office.Desktop_8wekyb3d8bbwe\AC\INetCache\Content.Word\屏幕截图(42).png C:\Users\16954\AppData\Local\Packages\Microsoft.Office.Desktop_8wekyb3d8bbwe\AC\INetCache\Content.Word\屏幕截图(44).png | |
| **Score** |  |

Code

4.6

Question(a)

load ctftmod.mat

z = [dash, dash, dot, dot]

plot(t,z),xlabel('t'),ylabel('z')

Question(b)

load ctftmod.mat

freqs(bf,af);

Question(c)

load ctftmod.mat;

ydash = lsim(bf, af, dash, t(1:length(dash)));

ydot = lsim(bf, af, dot, t(1:length(dot)));

subplot(2,1,1)

plot(t(1:length(dash)),dash),hold on,title('dash and ydash'),xlabel('freq'),ylabel('magn')

plot(t(1:length(ydash)),ydash,'r')

legend('dash','ydash');

subplot(2,1,2)

plot(t(1:length(dot)),dot),hold on,title('dot and ydot'),xlabel('freq'),ylabel('magn')

plot(t(1:length(ydot)),ydot,'r')

legend('dot','ydot');

Question(d)

clc

clear

load ctftmod.mat;

y = dash.\* cos(2 \* pi \* f1 \* t(1:length(dash)));

yo = lsim(bf, af, y, t(1:length(dash)));

plot(t(1:length(y)),y),hold on,title('y and yo'),xlabel('t'),ylabel('magn')

plot(t(1:length(yo)),yo,'r')

legend('y','yo')

Question(e)

clc

clear

load ctftmod.mat;

m1 = lsim(bf,af,x.\*cos(2\*pi\*f1\*t),t(1:length(x)));

plot(t,m1),title('m1'),xlabel('t'),ylabel('magn')

Question(f)

clc

clear

load ctftmod.mat;

m1 = lsim(bf,af,x.\*cos(2\*pi\*f1\*t),t(1:length(x)));

m2 = lsim(bf,af,x.\*sin(2\*pi\*f1\*t),t(1:length(x)));

m3 = lsim(bf,af,x.\*sin(2\*pi\*f2\*t),t(1:length(x)));

subplot(3,1,1)

plot(t,m1),title('m1'),xlabel('t'),ylabel('magn')

subplot(3,1,2)

plot(t,m2),title('m2'),xlabel('t'),ylabel('magn')

subplot(3,1,3)

plot(t,m3),title('m3'),xlabel('t'),ylabel('magn')